A METEORIC METABOLITE FROM DUNGANNON, VIRGINIA.[1]

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The iron here described was forwarded to the Museum by C. W. Castle, of Nickelsville, Virginia, who reported that it was found while plowing on what is locally known as "Copper Ridge," some 3 miles southeast of Dungannon, Scott County, Virginia. As received, it more nearly resembled an irregular mass of terrestrial limonite than a meteorite, though occasional depressions or thumb markings on the badly oxidized surface suggested its true nature. Oxidation had proceeded so far that in plowing it was broken into two pieces weighing respectively 5 and 23 pounds, or a total of about 13 kilograms. The fractured surface shows plainly an octahedral cleavage. The metal is soft enough to cut readily with a hand hacksaw, contains, so far as observed, no nodules of troilite or schreibersite, and is readily malleable.

The etched surface is unlike that of any iron that has come to my notice (see pl. 1). The octahedral structure is quite indistinct, sometimes almost entirely obliterated. The kamacite bands (gray in figure) are broad, short, and somewhat wavy, while taenite (white) is less conspicuous. The two notable features are (1) a fine granulation which seems to extend irregularly throughout the mass, and (2) the presence, within the kamacite bands, of numerous elongated and oval areas of a dull, lusterless black, a millimeter or so in diameter, which, in turn, enclose minute rounded bits of metal. The form and mode of occurrence is strikingly like that of the schreibersite in the iron of Rosario. By careful treatment of a small piece of the iron in which these were prevalent, I was able to so loosen the texture by partial solution in dilute hydrochloric acid as to allow digging out the material with a needle point. This proved to be a mixture of iron and amorphous carbon. No phosphorus was present. Figures 1 and 2 in Plate 2 show some of these enclosures under a magnification of some 10 diameters, the metal showing in gray, the carbon black. It is unquestionable that the high per cent (0.542) of carbon shown by the analysis is due to these enclosures. Carbon nodules are not unusual in meteoric irons, but, excepting in some photographs of Canon Diablo irons given me by Dr. Arthur Bibbins, I do not recall having before met with this peculiar type. Although containing no evident troilite, the etched surface is lusterless and

[1] Cat. No. 644, U. S. N. M.

tarnishes quickly. The granular structure is not as perfect and uniform as in the Roeburne, Australia, iron, but so closely simulates that which may be produced by heating an octahedral iron as to leave no doubt as to its origin, though whether or no the secondary heating was natural or artificial is uncertain. The fact that it was found in a plowed field some distance from the road suggests that it is natural and preterrestrial, and following Berwerth, I will classify it provisionally as a medium octahedrite with granular kamacite lamellae (Omk).

A sample of the iron submitted to Doctor Whitfield yielded:

	Per cent.
Soluble in boiling HCl (1 pt. HCl to 1 pt. H_2O)	98.92
Insoluble	1.08

The soluble portion yielded:

	Per cent.
Silicon	0.015
Phosphorus	0.130
Nickel	7.069
Cobalt	0.090
Iron	92.69
Total	99.994

The insoluble portion yielded:

	Per cent.
Phosphorus	11.564
Nickel and cobalt	38.89
Iron	49.00
Carbon	0.542
Total	99.996

Recalculated, there is obtained for total composition in mass:

	Per cent.
Iron	91.765
Nickel and cobalt	7.445
Phosphorus	0.252
Carbon	0.532
Silicon	0.014
Total	100.008

The unusual feature of the soluble portion is the absence of sulphur, which is an almost universal constituent of meteoric irons. Tests applied to other portions of the 800 gram mass in the Museum collections yielded like results. Chromium and copper were also lacking.

The insoluble portion must be considered schreibersite, low in iron and phosphorus, but correspondingly high in nickel and cobalt. The phosphide in the Cranbourne iron, it will be recalled, gave, according to Flight: Phosphorus, 12.95 per cent; iron, 49.33; nickel and cobalt, 38.24, though the mineral was classed as rhabdite. It is not possible to state what portion of the carbon is free and what combined, but as no cohenite was recognized in the insoluble portion it is probably in large part free, and has been so tabulated above.